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A NOTE ON THE SUBSPECIES OF
PARNASSIUS CLODIUS MENETRIES

FOUND IN THE ROCKY MOUNTAINS OF THE UNITED STATES
(PAPILIONIDAE)¹

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CONSIDERABLE CONFUSION EXISTS in the nomenclature associated with the genus *Parnassius* in North America. Further confusion was generated recently by the treatment of *Parnassius clodius* Ménétries in Howe, 1975. The purpose of this note is to differentiate clearly the three principal races of *P. clodius* found in the Rocky Mountains of the United States prior to further publication in a forthcoming book on butterflies of that region. John F. Emmel of Hemet, California is undertaking a study of the entire *clodius* complex for subsequent publication. The three taxa discussed in detail here are: *menetriesii* H. Edwards, *gallatinus* Stichel, and *altaurus* Dyar.

The nomenclatural problem first began in the mid-1800's when Boisduval published the name of the asiatic species *clarius* Eversmann in a preliminary list of California butterflies. This error was corrected in his 1869 list. In supplying information to W. H. Edwards for his Butterflies of North America series, Henry Edwards also used the name *clarius* to represent a race of *clodius*. In 1877, Henry Edwards recognized his error and described *menetriesii*. This action, however, did not put the problem to rest, as Edwards's specimens included what we now recognize as two subspecies: *baldur* Edwards and *menetriesii* in a restricted sense. The type series for *menetriesii* comprised specimens from California: Bear Valley in the Sierra Nevada,

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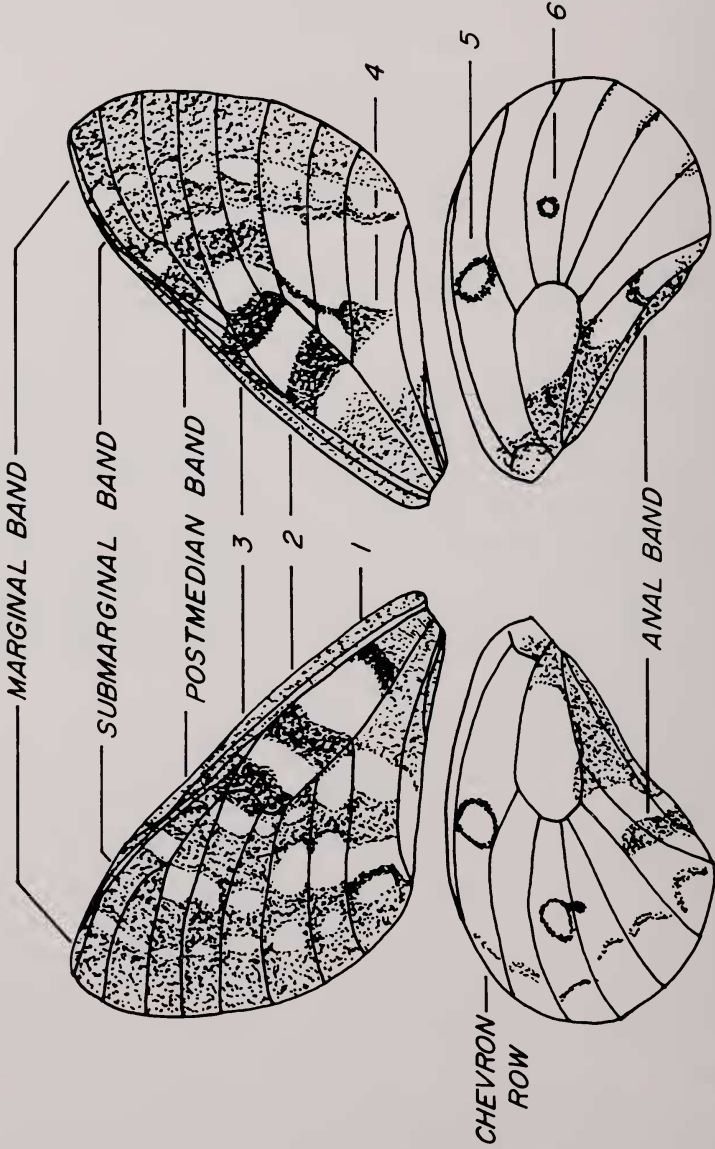


Fig. 1.—Maculation and spot designation in *Parnassius clodius*; male right, female left. *P. c. altaurus* is figured.

Lake Tahoe, Downieville collected by H. Behr and H. Edwards, and a female from Mt. Nebo, Utah, collected by I. D. Putnam. In his description of *menetriesii*, Henry Edwards cited the wide variation among the specimens in the type series and no holotype was designated. The name *baldur* was applied by William Henry Edwards in 1877 to specimens from the Sierra Nevada (see Brown, 1975 for further discussion).

In 1918, Barnes and McDunnough recognized the mixed series used in describing *menetriesii* and applied the name *in sensu stricto* to the female specimen from Utah. When Felix Bryk published his *Parnassius* monograph in "Das Tierreich" in 1935, he made a hopeless muddle of *clodius* in spite of the Barnes and McDunnough paper and an earlier paper by Skinner (1916). McDunnough, 1936, published extensive corrections to Bryk's work, but these appear to have been overlooked by most recent workers.

Figure 1 shows the general maculation found in *Parnassius clodius*. The specimens shown are *P. clodius altaurus*. In the ensuing descriptions, references are to the characters delineated in this figure.

P. CLODIUS MENETRIESII H. EDWARDS, 1877

This insect ranges from eastern Utah into southwest Wyoming where it intergrades into *gallatinus*. It is the most lightly marked of the three subspecies under discussion. The HW spots (5, 6) are red and not yellow as shown in Howe, 1975 (pl. 78, f. 18). In the males, the cell spots (2, 3) are quite narrow and the postmedian dark band is restricted to the post-cell area. Spot 4 is small, rounded and restricted to cell Cu_2 . The submarginal band is broken or incomplete. On the HW, spots 5 and 6 are small with 6 frequently reduced to a black dot. The anal band or chevron in cell 2V is usually absent, or very faint if present. The basal and inner margin dark dusting on the HW is light. In both sexes, spot 2 is only 1/3 to 1/2 as wide at its base as the width between veins Cu_1 and Cu_2 . In the females, the chevron row is nearly obsolete with distinct chevrons in cells Cu_2 and 2V only. On the FW, both the marginal and submarginal dark bands are quite narrow, and the postmedian band is broken in cell M_3 . Figure 2 illustrates the FW maculation in the males. In the females, spot 1 is nearly obsolete.

P. CLODIUS GALLATINUS STICHEL, 1907

This butterfly was described from Gallatin Co., Montana. It ranges from NW Wyoming through western Montana to Glacier National Park (E. M. Perkins, Jr., *in litt.*). In both sexes, spot 2 is from 1/2 to 2/3 as wide at its base as the width between veins Cu_1 and Cu_2 . Spots 5 and 6 are well-developed and red, with a black satellite spot to 6 in cell M_3 frequently appearing in the females. Spot 4 may be small in the males, but the postmedian band is lightly connected and complete. The females exhibit a distinct and complete postmedian band. In that sex, spot 1 is distinct. Figure 3 illustrates the FW maculation in the males. The chevron row in the females is faint but present, and the anal band in the males is faint-to-obsolete in most specimens.

P. CLODIUS ALTAURUS DYAR, 1903

This is the most distinct of the three subspecies under discussion. It was described from a short series taken by T. B. Evermann, July 26, 1896 at Alturas Lake, in the Sawtooth Mountains of central Idaho. Its range appears to be restricted to Blaine and Custer Counties and it is perhaps a glacial relict. It occurs at higher altitudes than the other *clodius* forms found in the state. See Hovanitz, 1968 for a discussion of present and ice age life zones and distributions. In 1902 (p. 1, entry 1b), Dyar first attributed *altaurus* to Wyoming, but he corrected this error in his 1903 description of the taxon. This error is probably responsible for subsequent Wyoming citations for this subspecies.

The primary character by which *altaurus* is separated from other races of *clodius* is the yellow color of spots 5 and 6. Other characters, as shown in Figure 1, are as follows: In both sexes, the base of spot 2 is as wide as the space between veins Cu_1 and Cu_2 . Spot 4 is large and the postmedian band is solidly connected in both sexes. The anal band or chevron row is quite distinct in the males, and especially so in the females. In the females, spot 6 may exhibit a satellite spot in M_3 , and in some examples, there is a narrow dark connecting band from the bottom of spot 6 to the top of the anal band. Spot 1 is distinct.

Another subspecies of perhaps doubtful status enters our area in Nez Perce Co., Idaho. This is *shepardi* Eisner, 1966 for which the type locality is Wawawai, Snake River, Whitman Co., Washington. It is a large and red-spotted race with its closest affinity to the northwestern subspecies *hel* Eisner, 1956 [T. L.

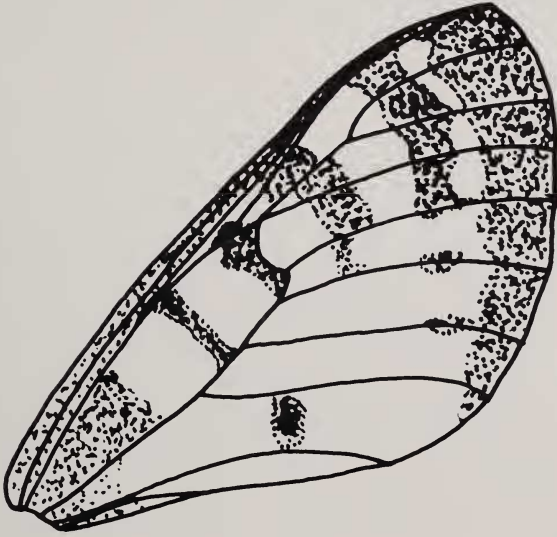


Fig. 2.—Forewing maculation of male *P. c. menetriesii*.

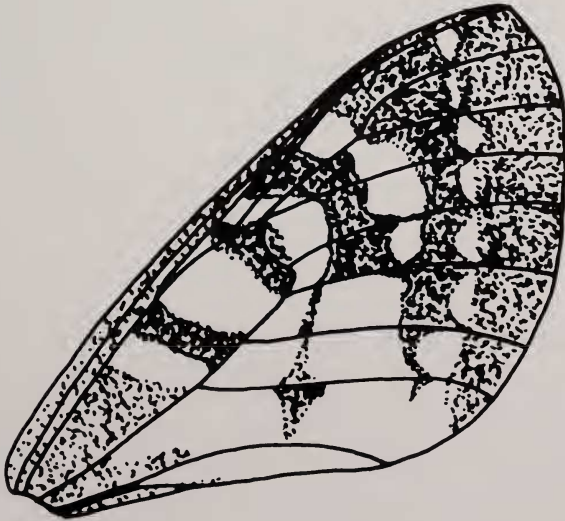


Fig. 3.—Forewing maculation of male *P. c. gallatinus*.

Stevens Pass, Washington] and *claudianus* Stichel, 1907 [T. L. "Washington"]. This author defers to Dr. Emmel to determine the status and validity of the northwestern *clodius* taxa.

Red-spotted *clodius* forms have been taken in Bannock, Bear Lake, Bonneville, Clearwater, Fremont, and Valley Cos., Idaho. All of the specimens examined were clearly intergrades between *menetriesii* and *gallatinus*. One male from nr. Fir Creek Campground, T12N, R10E, Valley Co. showed dark maculation approaching *altaurus*, but the spots were red. This is not surprising since Valley Co. borders on Custer Co. in which *altaurus* is found. Weak interaction between *altaurus* and the lower elevation red-spotted forms is to be expected in this region. Similar interaction is occasionally found in SE Idaho. Two yellow-spotted specimens, which in dark maculation are intergrades between *altaurus*, *gallatinus* and *menetriesii*, are in the W. N. Burdick collection at the University of Colorado Museum. These were taken on Pine Creek Pass, Bonneville Co. In the J. D. Eff collection, there is a phenotypic *gallatinus* taken on a low summit in SE Blaine Co., where *altaurus* flies at higher elevation.

In his 1935 monograph, Bryk included two other taxa in the Rocky Mountain fauna. One was *baldur*, previously mentioned, a California Sierran race. It was reputed to occur in the Teton Mountains based upon misidentification of a single strongly red-marked female *gallatinus* from Jackson Hole. *P. clodius sol* was described from a mixed series that included specimens from Nevada (probably the Sierra Nevada in California, Eisner, 1961) 3 males from Gunnison Co., Colorado, and a pair from the Teton Mtns. Although McDunnough, 1936, questioned the validity of *sol* because of the wide geographic area involved and overlapping ranges of other subspecies, Bryk and Eisner, 1937, adamantly defended their actions. The discussion in the Howe book restricts the range of *sol* to northern California. The Gunnison Co. record is either an error or the specimens were mislabeled, as these are the only Colorado records for *clodius*, in spite of extensive collecting in that state. All of the Teton Mountains records refer to *gallatinus*, or intergrades with *menetriesii*.

Figure 4 shows the distribution of *P. clodius* in the region treated by this paper. Because of the number of specimens involved, individual locality records are not cited to conserve space. Records by state and county are: *menetriesii*: **UTAH:**

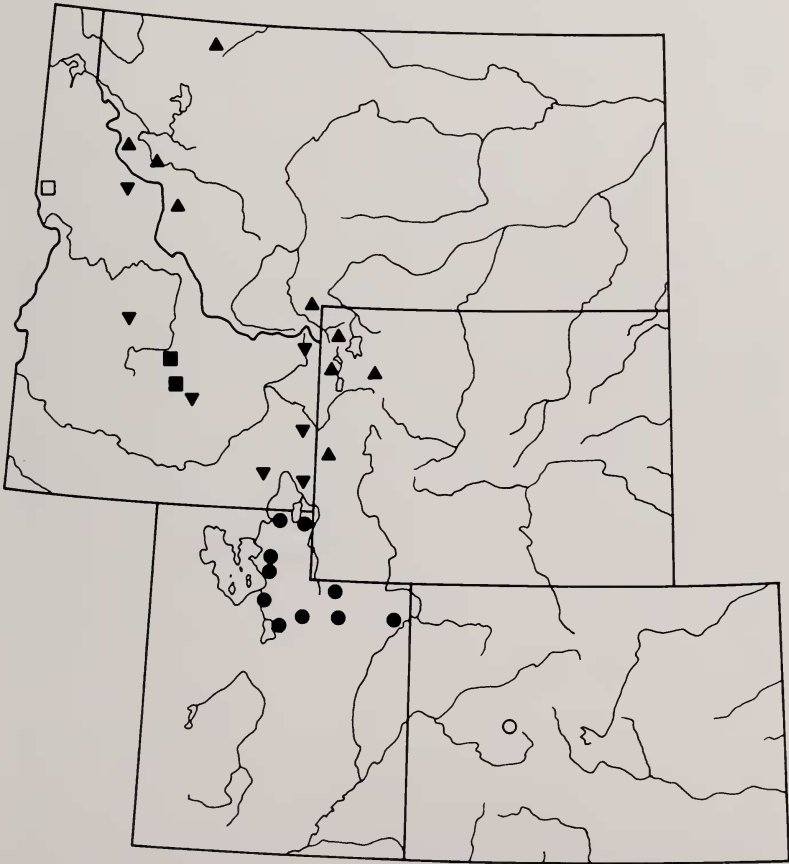


Fig. 4.—Distribution by county of *P. clodius* in the Rocky Mountains of the United States. Solid dot = *menetriesii*; triangle = *gallatinus*; solid square = *altaurus*; open square = *shepardi*; inverted triangle = *menetriesii-gallatinus* intergrades; open circle = questionable Gunnison Co., Colorado record.

Cache, Davis, Duchesne, Rich, Salt Lake, Summit, Uintah, Utah, Wasatch, Weber. *gallatinus*: WYOMING: Fremont, Lincoln, Teton, Park (Yellowstone N. P.); MONTANA: Gallatin, Glacier, Mineral, Missoula, Ravalli. *altaurus*: IDAHO: Blaine, Custer. *shepardi*: IDAHO: Nez Perce. Intergrade forms *menetriesii-gallatinus*: IDAHO: Bannock, Bear Lake, Bonneville, Clearwater, Fremont, Valley. The Utah records are from Callaghan and Tidwell, 1971.

A female cotype (syntype) of *menetriesii* is in the Henry Edwards collection at the American Museum of Natural History in New York City. This specimen, collected by I. D. Putnam at Mt. Nebo, Utah, figured by Skinner, 1916 (pl. XII, fig. 3) and mentioned by Barnes and McDunnough (1918), is hereby designated the lectotype for the taxon *menetriesii*. A red label, hand-printed in black ink, which reads: "*P. clodius/menetriesii* H. Edw./LECTOTYPE/designated by C. D./Ferris, April, 1976" has been affixed to the specimen pin.

Stichel's description of *gallatinus* was based upon a pair figured by Elrod, 1906 (page 16, fig. 15). The type specimens are currently in the entomological collection of the University of Montana at Missoula; it has been recommended that they be deposited in the collection of the American Museum of Natural History. They were collected by Prof. R. A. Cooley on 27 June, 1900 at 6800' (2027 m) in Gallatin Co., Montana. An additional pair (not designated as paratypes) is in the Cooley collection at Montana State University, Bozeman.

The type of *altaurus* is type specimen no. 6769 in the United States National Museum collection. It was collected by T. B. Evermann on 26 July, 1896 at Alturas Lake, Blaine Co., Idaho, 7000' (2134 m). Dyar did not figure *altaurus* in either his 1902 or 1903 papers. Howe has illustrated two subspecies under the name *altaurus*. Plate 68, figs. 13-14 depict *gallatinus* while figs. 15-16 are *altaurus*.

The types of *shepardi* are in the collection of the Rijksmuseum of Natural History, Leiden, Netherlands. Eisner figured the types (1966, pl. 1, f. 1-2); a topotypical male is figured by Howe (pl. 69, fig. 16).

SUMMARY

During the course of this study, three factors became apparent which have influenced the taxonomy of *Parnassius* in North America and have contributed to the confusion surrounding this genus. Many of the taxa have been described by European workers and it is evident from reading their papers that they had no understanding of North American geography. This has led to some of the problems. A major problem has been the erection of new taxa based upon very few specimens; in some cases only one or two. With a genus as variable as *Parnassius*, it is essential that long series be studied. Lack of familiarity with existing literature has contributed its share of problems, as confessed by Bryk and Eisner in their 1937 reply to McDunnough's 1936 criticism. It is essential that anyone doing taxonomic work search out the appropriate existing literature.

Many of the papers in which new *Parnassius* taxa are proposed lack any discussion of the variability in facies within the subspecies described, let alone adequate discussion of characters by which the proposed subspecies can be separated from its allies. Some taxa have been described from museum specimens collected many years prior to study. This can lead to difficulties as a result of specimen fading. With time, and elevated temperature in some cases, the red spots tend to assume an orange, pink or even yellow-orange cast not found in fresh material. In some forms, considerable fading occurs while the specimen is still alive, if it has been on the wing for several weeks. These situations have perhaps caused some workers to lump *gallatinus* and *altaurus*, when in fact, they are quite distinct entities.

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LITERATURE CITED

- BARNES, W. and J. H. McDUNNOUGH. 1918. *Contributions to the natural history of the Lepidoptera of North America*. 4(2):61-208.
- BOISDUVAL, J. A. 1869. Lépidoptères de la Californie. Extract from *Ann. Soc. Ent. Belg.* 12:1-94.
- BROWN, F. M. 1975. The types of the Papilionid butterflies named by William Henry Edwards. *Trans. Amer. Ent. Soc.* 101:1-31.
- BRYK, F. 1935. Lepidoptera Parnassiidae pars ii (subfam. Parnassiinae). *Tierreich* 65:i-li, 1-788, fig. 1-698.
- BRYK, F. and C. EISNER. 1937. A reply to the critical review of the treatment of the American species of *Parnassius* in the "Tierreich" by J. Mc. [sic] Dunnough in "The Canadian Entomologist". *Parnassiana* 5:3-7.
- CALLAGHAN, C. J. and K. B. TIDWELL. 1971 (1973). A checklist of Utah butterflies and skippers. *J. Res. Lepid.* 10(3):191-202.
- DYAR, H. G. 1902. A list of North American Lepidoptera and key to the literature of this order of insects. *Bull. U. S. Nat. Mus.* no. 52. i-xix + 723 p.
- . 1903. New North American Lepidoptera with notes on larvae. *Proc. Ent. Soc. Wash.* 5:290-298.
- EDWARDS, H. 1877. Pacific coast Lepidoptera, No. 22. Notes on some diurnal Lepidoptera, with descriptions of new varieties. *Proc. Calif. Acad. Sci. (San Francisco)* 7(12):163-174.
- EDWARDS, W. H. 1877. Catalogue of the diurnal Lepidoptera of America north of Mexico. *Trans. Amer. Ent. Soc.* 6:1-68.
- EISNER, C. 1956. *Parnassiana* nova. X. Zwei neue nordamerikanische *Parnassius* Subspecies. *Zool. Meded.* 34(18):243-245, pl. iii.
- . 1961. *Parnassiana* nova. XXX. Nachträgliche Betrachtungen zu der Revision der Subfamilia Parnassiinae. *Zool. Meded.* 37(11):167-188.
- . 1966. *Parnassiana* nova. XXXIX. Nachträgliche Betrachtungen zu der Revision der Subfamilie Parnassiinae (Fortsetzung 12.) *Zool. Meded.* 41(8):143-149.
- ELROD, M. J. 1906. The Butterflies of Montana. *Bull. Univ. Montana* no. 30 (Biological Series no. 10). 174 p. + 117 fig. + 13 pl.
- HOVANITZ, W. 1968. Present and ice age life zones and distributions. *J. Res. Lepid.* 7(1):31-34.
- HOWE, W. H., Contr. Ed. 1975. *The Butterflies of North America*. Doubleday and Co., Inc., Garden City, L. I., New York. xiii + 633 p. + 97 pl.
- McDUNNOUGH, J. 1936. A critical review of the treatment of North American *Parnassius* species by Felix Bryk in *Das Tierreich*, part 65. *Canad. Ent.* 68:216-225.
- SKINNER, H. 1916. The genus *Parnassius* in America (Lep.). *Ent. News* 27:210-216. Note: Two plates appear. Plate XII included with Skinner's paper did not reproduce well and was reprinted in the next issue of the journal.
- STICHEL, H. 1907. Lepidoptera Rhopalocera. Fam. Papilionidae. Subfam. Parnassiinae. *Wytzman Gen. Ins. Fasc.* 58:1-60.